APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/083,773	02/27/2002	William Arthur Welsh	67,008-041/S-5453	5465

				EXAMINER
26096	7590	11/07/2005		KURR, JASON RICHARD

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ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 11/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Office Action Summary	Application No.	Applicant(s)
		10/083,773	WELSH ET AL.
		Examiner	Art Unit
		Jason R. Kurr	2644

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>27 February 2002</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-19</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-19</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>2/27/02</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date <u>8/7/02 10/1/02.... 2/16/05</u>

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____ .

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 4 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites the limitation "said sampling rate" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 2, 3, 5, 6, 9, 14, 15, 16, 17, 18 and 19 are rejected under 35 U.S.C. 102(a) as being anticipated by Ivers (WO 00/20775).

With respect to claim 1, Ivers discloses a method for controlling a physical variable at a frequency of interest (f_d) including the steps of:

a) sampling the physical variable at a sample frequency less than twice the frequency of interest (f_d) (pg.14 ln.5 , fig.15a #29a);

b) calculating at least one control command based upon the sampling of the

physical variable (fig.15a #54 , fig.15b #54); and

c) generating a force for controlling the physical variable based upon the control

command (fig.15a #29b).

With respect to claim 2, Ivers discloses the method of claim 1, further including

the steps of: band pass filtering the physical variable prior to said step a) (pg.13 ln.24-

26 , fig.16 #48).

With respect to claim 3, it is inherently known in the art that in order to process a

specific frequency, a band pass filter extracts a frequency range around the desired

frequency with a lower and upper bound. These bounds can be generally given by $(2n-1)*f_s/2$ and by $(2n+1)*f_s/2$, where n is an integer chosen so that the frequency

of interest is within the upper and lower bounds.

With respect to claim 5, Ivers discloses the method of claim 1 further including

the step of generating the at least one control command at a rate less than twice the

frequency of interest (pg.14 ln.35-38).

With respect to claim 6, Ivers discloses a method for computing control

commands at a reduced rate in a noise or vibration control system including the steps

of:

a) sensing a physical variable (fig.15a #32);

b) identifying harmonic components (a.sub.k, b.sub.k) of the physical variable at a frequency of interest (f.sub.d) (fig.15a #52a);

c) down-sampling the harmonic components (a.sub.k, b.sub.k) to a lower update frequency (f.sub.u) (fig.15b #73);

d) performing control computations on the harmonic components (a.sub.k, b.sub.k) at the lower update frequency (f.sub.u) (fig.15b #54); and

e) generating control commands based upon the control computations (fig.15a #29b).

With respect to claim 9, Ivers discloses the method of claim 6 further comprising: low-pass anti-aliasing filtering to prevent aliasing in sampling at a lower update frequency (f.sub.u) (fig.15b #72).

With respect to claim 14, Ivers discloses a method for analyzing a physical variable having a first frequency of interest f.sub.1 and a second frequency of interest f.sub.2 including the steps of:

a) identifying first harmonic components a.sub.k1, b.sub.k1 of the first frequency of interest f.sub.1 (fig.15a #52a);

b) down-sampling the harmonic components a.sub.k1, b.sub.k1 at an intermediate frequency f.sub.u1 (fig.15b #73);

c) identifying second harmonic components a_{k2}, b_{k2} of a difference between the first frequency of interest f_1 and the second frequency of interest f_2 (fig.15a #52a);

d) down sampling the harmonic components a_{k2}, b_{k2} at an update frequency f_{u2} (fig.15b #73); and

e) analyzing information at the first frequency of interest f_1 and the second frequency of interest f_2 based upon said harmonic components a_{k1}, b_{k1} and a_{k2}, b_{k2} (fig.15a #54).

With respect to claim 15, it is inherent that when a frequency is down sampled the new frequency is less than the previous frequency. If f_{u1} is the frequency before down sampling, and f_{u2} is the frequency after down sampling it would be inherent that the intermediate frequency f_{u1} is higher than the update frequency f_{u2}.

With respect to claim 16, Ivers discloses the method of claim 14 further including the steps of: f) generating control signals at the update frequency f_{u2} based upon said step e) (fig.15a #52b).

With respect to claim 17, Ivers discloses an apparatus for sensing physical variables at a reduced rate comprising: a sensor adapted to sense physical variables

and to generate a sensed signal as a function of the sensed physical variable (fig.15a

#32); and

a control circuit adapted to establish a frequency of interest (f.sub.d), and to

establish a sample frequency (f.sub.s) (fig.15b),

wherein the control circuit filters the sensed signals to extract a frequency range

with a lower bound given by (2n-1)*f.sub.s/2 and an upper bound given by

(2n+1)*f.sub.s/2, where n is an integer chosen so that the frequency of interest (f.sub.d)

is within the extracted frequency range (pg.13 ln.24-26).

With respect to claim 18, Ivers discloses the apparatus of claim 17, wherein the

control circuit attenuates the filtered sensed signal at a frequency less than the

frequency of interest (f.sub.d) by high-pass anti-aliasing to produce a resultant signal

(fig.15b #74).

With respect to claim 19, Ivers discloses the apparatus of claim 17 wherein the

control circuit aliases the filtered sensed signal to a lower frequency when there is no

information present at the lower frequency in the sensed signal and the control circuit

extracts desired information (fig.15b #72 , pg.15 ln.27-29).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4, 11, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ivers (WO 00/20775) in view of Kotoulas et al (US 6,493,689 B2).

With respect to claim 4, Ivers discloses the method of claim 1 however does not disclose expressly wherein said physical variable includes information within a bandwidth including said frequency of interest and wherein said sampling rate is at least twice the bandwidth of this information.

The Kotoulas reference discloses sampling the physical variable at twice the bandwidth of the variable, which lies in a narrow bandwidth (col.16 ln.3-13).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the sampling method of Kotoulas in the method of Ivers.

The motivation for doing so would have been to have an adequate sampling rate to receive enough information from the physical variable for further processing.

With respect to claim 11, Ivers discloses the method of claim 6, however does not disclose expressly wherein said physical variable comprises a plurality of physical variables.

The Kotoulas reference discloses a method wherein a physical variable comprises a plurality of physical variables (fig.1 #49 , fig.4 #115,126) including the steps of:

f) generating a sensed signal as a function of each of said plurality of physical variables (fig.4 #119,120,121); and

g) computing harmonic estimates for each sensed signal at each sample time (col.12 ln.14-35 , fig.4 #108).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to sense and process a plurality of physical variables as in the Kotoulas reference.

The motivation for doing so would have been to allow for control of vibrations and noise being emitted from a plurality of noise sources.

With respect to claim12, Ivers discloses the method of claim 11, however does not disclose expressly further utilizing every Nth harmonic estimator output z.sub.Nk where N is the ratio of the sampling frequency and the update frequency (f.sub.s/f.sub.u).

The Kotoulas reference discloses utilizing every Nth harmonic estimator output from the control signal (col.20 ln.14-28).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use a control signal that contains every Nth harmonic.

The motivation for doing so would have been to reduce vibrations and noise in the output signal.

With respect to claim 13, Ivers discloses the method of claim 11, however does not disclose expressly the method further comprising: generating separate control commands for each of multiple tones; adding control commands for each tone; and outputting a sum of the control commands for each tone to one or more force generators.

The Kotoulas reference discloses a method further comprising: generating separate control commands for each of multiple tones; adding control commands for each tone; and outputting a sum of the control commands for each tone to one or more force generators (fig.4 #108,102,112).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to generate a control command for each of the plurality of sensed tones as in the Kotoulas reference.

The motivation for doing so would have been to reduce noise or vibrations from a plurality of sources.

Claims 7, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ivers (WO 00/20775) in view of Bennett et al (US 6,429,939 B1).

With respect to claim 7, Ivers discloses the method of claim 6 however does not disclose expressly further including the step of: f) generating harmonic components of the control commands in said step e).

The Bennett reference discloses a method of generating harmonic components of the control commands based upon control computations (col.2 ln.35-59).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to generate harmonic components of the control signal as in the Bennett reference.

The motivation for doing so would have been to control the amplitude and phase of the control signal.

With respect to claim 8, Ivers discloses the method of claim 7 in view of Bennett, further including the step of: g) generating a control output at a frequency higher than the lower update frequency (Ivers pg.14 ln.35-38).

With respect to claim 10, Ivers discloses the method of claim 6, however does not disclose expressly the method further comprising: obtaining estimates of the harmonic components by computing a fast-Fourier transform of the physical variable; and extracting the result corresponding to the frequency of interest ($f_{sub.d}$).

The Bennett reference discloses a method comprising: obtaining estimates of the harmonic components by computing a fast-Fourier transform of the physical variable; and extracting the result corresponding to the frequency of interest ($f_{sub.d}$) (col.2 ln.5-10).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to obtain the harmonic components by using a fast-Fourier transform as in the Bennett reference in the method of Ivers.

The motivation for doing so would have been to convert the signal to the frequency domain for further processing of the harmonic components.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Haga (EP 0 814 279 A2).

Haga discloses a compact vibration cancellation apparatus.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason R. Kurr whose telephone number is (571) 272-0552. The examiner can normally be reached on M-F 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on (571) 273-8300. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

JK

XU MEI
PRIMARY EXAMINER